Remarks

Claims 4-12 are pending. Claims 5, 8, 9, 11 and 12 have been cancelled without prejudice or disclaimer. Claims 4, 6, 7 and 10 have been amended.

Claims 4, 7 and 10 stand rejected under 35 USC §102(b) as anticipated by Jurmann. Claim 4 has been amended to incorporate the features of Claim 5, Claim 7 has been amended to incorporate Claim 9, and Claim 10 has been amended to incorporate Claim 12. The Applicants respectfully submit that the rejection of Claims 4, 7 and 10 is now moot in view of the incorporation of the subject matter of Claims 5, 9 and 12, respectively. Reconsideration and withdrawal of the rejection is respectfully requested.

Claims 5, 6, 8, 9, 11 and 12 stand rejected under 35 USC §103(a) as obvious over Jurmann in view of JP '620. The rejection maintains that it would be obvious to modify Jurmann by combining it with the teachings of JP '620 regarding the use of hydrocarbon and carbon in a batch-type furnace.

The Applicants respectfully submit that the rejection of Claims 5, 8, 9, 11 and 12 is moot because those claims have been cancelled. The Applicants further submit that Claim 6, as well as amended Claims 4, 7 and 10, which incorporate features of the cancelled claims, are not obvious over the combination of Jurmann and JP '620.

A continuous bright annealing furnace like the claimed system and Jurmann requires entry and exit ports for the steel strip, which expose the internal environment of the furnace and generates gas leakage. As a result of gas leakage and the presence of alloy components in the furnace, such as chrome, nickel, manganese and titanium, the internal environment is in an unsteady state of disequilibrium. Indeed, even if pressure of the continuous furnace is reduced to control the internal environment, it may not be effective because the gases produced by the steel strip disturb the controlled environment.

As recited in the rejected claims, the partial pressure of steam in the bright annealing furnace is less than $1x\ 10^{-5}$ by lowering the dew point of the internal environment by means of introducing a hydrocarbon or carbon component. In sharp contrast, the Jurmann reference teaches reducing the oxygen content of a continuous bright annealing furnace by purging the environment with hydrogen or nitrogen gas. However, hydrogen flowing into such a state of disequilibrium in a continuous bright annealing furnace does not maintain the dew point at a

temperature of -60°C. Without providing a continuous supply of hydrogen or hydrogen of increased purity, the dew point rises to -30° C to -40 °C and generation of white powder cannot be suppressed by merely referring to the Ellingham diagram and controlling the temperature accordingly. (*See* the Applicants' specification at paragraph [0016].)

As opposed to merely maintaining a hydrogen-rich environment, the hydrocarbon and carbon components undergo a chemical reaction that lowers the dew point and partial pressure of steam and prevents the formation of white power. Furthermore, the reaction of hydrocarbon and carbon components offers an advantage over merely flushing the internal environment of the furnace with hydrogen because large amounts of hydrogen and high processing costs are not required to maintain an oxygen content of less than $1x10^{-5}$ in the continuous furnace. Thus, unlike Jurmann, which controls only by flushing the system with hydrogen, the use of hydrocarbon or a carbon component controls the internal environment of a continuous furnace against a variety of influences. Accordingly, the Applicants respectfully submit that the method of Jurmann is distinct from the method recited in the rejected claims.

The Applicants further respectfully submit that one skilled in the art would not look to the batch-type furnace of JP '620 to modify the continuous bright annealing furnace of Jurmann because the characteristics and properties of the two furnaces are distinct. While the rejected claims pertain to a continuous bright annealing furnace for heat-treating a steel strip, the furnace of JP '620 relates to a batch-type bright annealing furnace. The difference between these two different kinds of bright annealing furnaces is significant because the claimed furnace continuously heat treats steel, whereas the furnace of JP '620 only treats steel in discrete batches.

Furthermore, as discussed above, gas-leakage from the entry and exit port of a continuous bright annealing furnace and the presence of alloy components in the furnace result in the internal environment having an unsteady state of disequilibrium. Indeed, even if pressure of the continuous furnace is reduced to control the internal environment, the gases produced by the steel strip disturb the controlled environment. In contrast, the equilibrium of the internal environment of the batch-type furnace can easily be maintained because it is a closed system and a vacuum process or flushing with hydrogen gas may be used to create a steady state of equilibrium.

Furthermore, a batch-type furnace requires control of the changing temperature as the furnace performs the heating process. Therefore, in contrast to a continuous heat-annealing

furnace having a constant temperature and partial pressure of steam, the gas composition of a batch furnace must be specifically controlled to maintain the partial pressure of steam over a range of varying temperatures.

The Applicants respectfully submit that JP '620 does not teach a method of controlling the internal environment under disequilibrium and an unsteady state of a continuous furnace because JP '620 teaches a batch-type furnace as opposed to a bright annealing furnace. Accordingly, one skilled in the art would not look to JP '620 for guidance in solving the problems associated with controlling the internal environment of a continuous furnace.

In light of the foregoing, the Applicants respectfully submit that the entire application is now in condition for allowance, which is respectfully requested.

Respectfully submitted,

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